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POSTAL REGULATORY COMMISSION
WASHINGTON, DC 20268-0001

Price Elasticities and Internet Diversion) Docket No. RM2014-5

PUBLIC REPRESENTATIVE COMMENTS

(August 28, 2015)

These Comments respond to the Commission's June 12, 2015, Notice of Inquiry No. 1 regarding price elasticity and Internet diversion of Postal Service products.[1] The NOI presents questions for comment relating to the practical application of features included in the Branching AIDS Model proposed for estimating postal product price elasticities. *See* Library Reference PRC-LR-RM2014-5/2.

I. INTRODUCTION

This proceeding was initiated by a petition filed jointly on May 2, 2014 requesting a Commission proceeding to consider improvements in the econometric volume demand model prepared by the Postal Service to measure the price elasticities of demand for postal products.[2] In response, the Commission issued a Notice and Order establishing this proceeding.[3] The Commission stated that it viewed the petition as a

[1] Notice of Inquiry No. 1, June 12, 2015 (NOI).

[2] Petition to Improve Econometric Demand Equations for Market-dominant Products and Related Estimates of Price Elasticities and Internet Diversion, May 2, 2014 (Petition). The petition was filed by National Postal Policy Council ("NPPC"), the Association for Mail Electronic Enhancement ("AMEE"), the Association of Marketing Service Providers ("AMSP"), GrayHair Software, Inc. ("GrayHair"), the Greeting Card Association ("GCA"), the International Digital Enterprise Alliance, Inc. ("IDEAlliance"), the Major Mailers Association ("MMA"), and the National Association of Presort Mailers ("NAPM").

[3] Notice and Order Scheduling Technical Conference (Notice and Order), Order No. 2117, July 9, 2014 (Notice and Order).

request to identify areas of possible improvement in demand analysis and forecasting and to potentially amend the Commission's rules in 39 CFR part 3050. Notice and Order at 4. The Commission is exploring the current methods of deriving demand elasticities by product and alternative methods already developed. *Id.* at 4-5.

The Notice and Order attached a recent technical paper presenting the proposed Branching AIDS model for estimating United States postal price elasticities.[4] Following the order initiating this docket, a technical conference was held August 13, 2014, where Mr. Edward S, Pearsall presented the Branching AIDS Model paper.[5]

In response to the Notice and Order, the Public Representative's Comments filed September 19, 2014, attached a paper prepared by Professor Mark J. Roberts, Professor of Economics at The Pennsylvania State University at University Park, Pa.[6] Professor Roberts' analysis concluded the AIDS model provides an appropriate starting point for analyzing the aggregate quarterly time-series data used in the study. He discussed the difficulty of estimating price elasticities, and particularly elasticities that vary over time, with this type of data. As steps to improve the demand and price elasticity estimates, he suggested incorporating a richer set of demand controls and disaggregating the data by some geographic area that could help estimation of demand curves for postal product. The type and quality of the data, rather than model specification, represents the biggest weakness in this area of demand analysis. He suggested that micro data on types of mail customers could provide better estimates of demand curves. Measures of relative prices would be useful to capture non-postal products substitutions.

After reviewing the comments, the Commission issued the NOI requesting responses to seven questions.

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[4] "A Branching AIDS Model for Estimating U.S. Postal Price Elasticities," Lyudmila Y. Bzhilyanskaya, Margaret M. Cigno and Edward S. Pearsall, undated. The views are those of the authors and not endorsed by the Commission. Notice and Order at 5.

[5] *See* Library Reference PRC-LR-RM2014-5/2 – List of Files for the Technical Conference, August 13, 2014. The Technical Conference included a discussion by Lyudmila Y. Bzhilyanskaya, Margaret M. Cigno, and Edward S. Pearsall. *See* PRC-LR-RM2014-5/2, "Notice Documentation rev2.docx," A Branching AIDS Model for Estimating U.S. Postal Price Elasticities (Branching AIDS Model).

[6] "Estimating Price Elasticities of Demand for Postal Products," September 15, 2014.

II RESPONSES TO QUESTIONS

The seven questions presented in the NOI are reproduced below. The Public Representative's responses immediately follow each question.[7]

1. The Branching AIDS Model attempts to explain mailers' behavior in part by incorporating assumptions regarding allocation of mailers' expenditures across postal products (*e.g.,* retail vs. commercial packages).

   a. What, if any, assumptions regarding mailers' behavior, either included in the Branching AIDS Model or otherwise, should be incorporated into the postal demand and forecasting models and why?
   b. What other factors that affect mailing choices should be reflected by the postal demand and forecasting models and why?

   Response:

   a. The assumption that mailers consider mail as an aggregate class of product, with substitution between classes as necessary, is sound, but is in many cases only a subset of a wider class of communication products (e.g. email, instant messaging, and social media). Considering mailers as an aggregate entity, however, is too reductionist. Each mailer will have a different indifference curve with respect to each postal (or communication) product. To that extent, any assumptions concerning mailers' behavior should be considered at a more disaggregated level than "all mailers." The response to question 6 details some possible disaggregated classes of mailers to consider.

   b. To that extent that we consider mail as one type of communication which mailers choose to use, incorporating diversion variables will help account for substitutes to mail. It may also be possible to find and incorporate variables to account for parcel substitutes (e.g. UPS, FedEx). Demographic data should also be included in the postal demand models, discussed below in the response to question 6.

[7] Professor Roberts did not participate in the preparation of these comments.

2. The Branching AIDS Model includes "share equations" at the branching points where the aggregated postal revenues are divided by class of mail, then by mail categories, and finally, by shapes.[8]

   a. Would introducing share equations into the postal demand and forecasting models be useful? If yes, what kinds and why? If not, why not?
   b. Please provide any available information regarding the "ongoing effort to estimate separate shape-based demand equations."[9]
   c. What are the major obstacles for introducing share equations into the postal demand and forecasting models? What factors create these obstacles and how can these obstacles be overcome?
   d. What kind of investigations (including, but not limited to, any analytical work or statistical testing) should the Postal Service perform to improve its demand and forecasting models by introducing share equations, similar to those outlined in the Branching AIDS Model?
   e. If the Postal Service incorporates share equations into its demand and forecasting models, what is the most reasonable branching structure that would allow the Postal Service to calculate price elasticities at more disaggregated levels than it is currently capable of doing (*e.g.*, by rate category or by shape)?

   Response:

   a. Share equations would prove useful in demand and forecasting because they allow the Postal Service to consider each class of mail in relation to each other, and to see clearly how consumers modify their budget in response to changes in prices and features. With additional demographic variables, it could also piece together profiles of consumer groups, which could then be used for more granular models and product targeting, though the demographic variable can also be used in the current USPS models.

   b. No response.

[8] At each branching point, which might represent all the U.S. domestic mail, class of mail, mail category etc., the share equations divide the postal revenues between the corresponding branches. *Id.* at 1, 11-17.

[9] Postal Service Comments at 19.

c. Aggregating all kinds of mailers into a single AIDS model, as The Postal Service argues, is too much of an aggregation for one model, as mailers cannot be aggregated into a single average. However, employing share equations for certain classes of mail which tend to be the domain of an averagable class of mailer (e.g. Periodicals) is worth considering.

d. The Postal Service notes that it considers cross-price elasticities in intervention variables and tests them in other models, finding them statistically insignificant. Additional transparency with those models would help to allay concerns about cross-price elasticity.

e. The most reasonable branching stricture would be the one that most accurately reflects consumer choices. When noncommercial mailers are using postage to communicate, they are most likely looking at the cheapest means of sending their predefined letter, flat or parcel. In that case, share equations by shape would hold merit. Commercial mailers, however, are more cognizant of different combinations of shapes and rates so as to maximize their profits, as their firms have the benefit of division of labor to allow employees to specialize in mailings. Therefore, with firms seeking to maximize profit, they are likely to be more sensitive to whichever factor (rates or shape) has a larger impact on profit maximization. This, however, assumes that the breakdown of mail is first done by consumer groups, rather than by product.

3. The Branching AIDS Model discussed at the technical conference found that changes in average revenue per-piece tend to be less than proportional to changes in fixed-weight price indices. This is because mailers may be able to adjust their mail mix within a mail category in order to mitigate some of the rate increases.[10] Please discuss:

[10] Postal Service Comments at 5. Average revenue per piece reflects postal customers' collective responses to a complex postal tariff and is an endogenous measure of responses to the tariff. Branching AIDS Model at 7.

a. Implications this finding might have for revenue forecasting.
b. Any further evaluation that will be necessary before incorporating it into the postal demand and forecasting models.
c. The likely impact of incorporating this finding on the demand and forecasting models and the estimated elasticities.

Response:

a. This implies that mailers are more likely to see mail as a communications and transportation service, rather than as individual products.

b. As a result, it is important to consider how they allocate their budget across products, as well as other communication services. To that end, including additional mail classes in demand equations can help, where an economically explainable link between the classes exists. Another option would be to use share equations for those classes of mail between which distinct classes of mailers tend to allocate money.

c. Incorporating this finding may develop a clearer link between classes and categories, which can help improve both own-price elasticities and cross-price elasticities (where computed).

The following questions relate to possible further research on the postal demand and forecasting models.

4. As electronic diversion appears to have a major impact on postal demand, please provide responses to the following questions at the most disaggregated level of detail available.

a. What factors (*e.g.*, technological, economic, societal, cultural, demographic, etc.) collectively define electronic diversion?
b. What variables that capture electronic diversion (aside from intervention variables or trends) are worth considering in the postal demand and forecasting models?
c. What are the sources of data for modeling electronic diversion?
d. Are there specific models that can be adopted for modeling electronic diversion of postal demand?

Response:

a. Electronic diversion is, at its highest level, the shift from communication via letters and other printed matter or media materials to communication via electronic means. With the development of the internet, instant messaging has become a reality, and thousands of services exist to facilitate it. Some of the most popular services include the following:

- E-mail, which allows users to send messages through the internet across different domains (e.g. a Gmail user can send an email to a Yahoo user). A single user can possess multiple email address for discrete uses.
- Instant messaging (IM), which allows users to send messages to each other in a single domain through the internet (*e.g*. a Facebook user can message other Facebook users, but not an AOL user). Because of this limit, instant messaging can have some technical features beyond email, including special characters, stickers, and read receipts (showing when a message was received and read).
- Text messaging, which allows users to send messages to each other through cellular networks. Originally limited to 160 characters, more modern phones can expand the character limit indefinitely.

Several factors can explain the development of electronic diversion:

- Technological: the development of high-speed, low-cost internet and computing technology make it easier for people to access the internet and communicate across it. The development of fashionable and accessible cell phones and nationwide cellular networks also aided in diversion
- Economic: the cost of sending a letter is clearly spelled out in the price of the envelope, postage stamp, paper on the letter, and time to delivery, making it clear to an economic actor. The costs of sending an email, IM, or text message, however, are harder to discern. The cost of sending an email or IM is bundled into the sender's electric bill, computer

price, internet bill, etc. Combined with the multi-faceted uses of computers, in contrast with the singular purpose of a letter, it is highly unlikely that economic actors fully evaluate the costs of sending an email against sending a letter. While text messages have different cost components, the bundling of services and subsequent result is similar.

- Societal: Time is money. People are sensitive to the opportunity cost of time. As the U.S. enters the 21st century, time is more valuable than ever, because of the myriad of ways to spend it. As a result, the speed of an email will often drive people to that medium over letters.
- Cultural: a recent concern, particularly among tech-savvy millennials, is privacy, particularly in light of bulk data collection by the government and private entities (*e.g*. Facebook). As a result, they place a premium on private communications, moving toward services that offer privacy and security (*e.g*. iMessage, Snapchat)
- Demographic : Similar to the above point, millennials are more drawn to the efficiency of electronic communication, and, having grown up with the technology, are more likely to use it.

b. Capturing diversion econometrically is difficult, but certain variables exist across the major means of electronic communication:

- Email: capturing email usage is difficult, because of the variety of services, and the ability for one user to possess multiple email accounts. Instead, broadband penetration, available from the OECD, can serve as a proxy for email account users, though it may overstate email usage (not all broadband users will use email).
- Instant messaging: instant messaging faces a similar problem to email, in the constantly growing number of services, many of which have messaging only as a component of their service (*e.g*. Facebook). All of these services, however, require access to the internet, allowing broadband penetration to serve as a proxy
- Text messaging: In the US, the cellular networks, a necessary component for text messaging, are overwhelmingly controlled by four

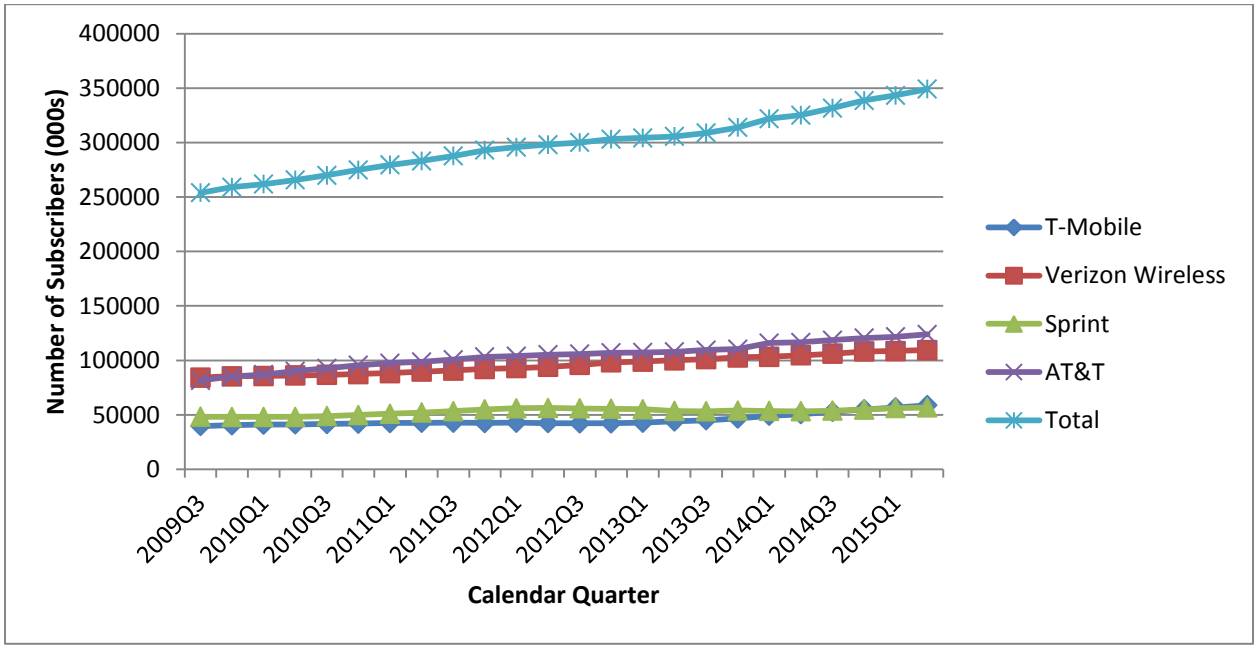
publicly-traded companies: Verizon, AT&T, T-Mobile, and Sprint. As a result, their user numbers are available from their quarterly reports, and can be used to represent text usage.

c. Modeling demographic trends (specifically income and age) via Census data can also help account for diversion, as younger people are more likely to communicate electronically. Similarly, lower income people may have less access to the internet, but more access to text messaging.

One data source for modelling internet diversion is the number of users at the largest cellular networks: Verizon, AT&T, T-Mobile, and Sprint. Below is an example of a source (table and chart) of cellular network subscriber growth from 2009 Q3 through 2015 Q2,

Cellular Subscribers (2009 Q3--2015 Q2)

CY	T-Mobile	Verizon Wireless	Sprint	AT&T	Total (000s)
2009Q3	39742	84268	48281	81596	253887
2009Q4	40429	85445	48133	85120	259127
2010Q1	41044	85715	48058	86987	261804
2010Q2	41254	86176	48169	90130	265729
2010Q3	41614	86734	48813	92761	269922
2010Q4	41889	87535	49910	95536	274870
2011Q1	42516	88414	51031	97519	279480
2011Q2	42665	89735	52123	98615	283138
2011Q3	42860	90708	53399	100738	287705
2011Q4	42532	92167	55021	103247	292967
2012Q1	42761	92988	56103	103940	295792
2012Q2	42460	94154	56386	105206	298206
2012Q3	42307	95899	55963	105871	300040
2012Q4	42276	98230	55626	106957	303089
2013Q1	42859	98930	55211	107251	304251
2013Q2	44016	100124	53588	107884	305612
2013Q3	45039	101150	53252	109460	308901
2013Q4	46684	102799	53934	110376	313793
2014Q1	49075	103330	53551	116014	321970
2014Q2	50545	104637	53331	116634	325147
2014Q3	52890	106156	53921	118650	331617
2014Q4	55018	108211	54888	120554	338671
2015Q1	56836	108582	56137	121772	343327
2015Q2	58908	109548	56812	123902	349170



Sources:
T-Mobile Supplementary Financial Data
Verizon Wireless Financial and Operational Information
Sprint Financial and Operating Information
AT&T Financial and Operational Results

Notes:
T-Mobile column includes MetroPCS customers
Sprint column includes Nextel customers

d. The current postal service demand models could be modified to include these variables. The AIDS model could also be used.

5. "Indirect competitors" (including, but not limited to, television, radio, periodicals or billboard advertising or long-distance telephone calls) might also have had an impact on postal demand.

a. What factors that reflect "indirect competitors" of the Postal Services are relevant to postal demand? If feasible, please provide the applicable factors separately for different types of "indirect competitors."
b. What relevant explanatory variables that capture the potential causes of changes in postal volumes due to "indirect competitors" should be included into the postal demand and forecasting models?

c. What data sources are available for modeling the impact of "indirect competitors" on postal demand?
d. Are there any models that could be adopted for modeling the impact of "indirect competitors" on postal demand? Please discuss.

Response:

a. When considering indirect competition, we need to consider what kind of purpose the USPS serves for mailers. To some, it is a means of advertising; to others, a form of interpersonal communication. Indirect competition in the media primarily affects the advertising side of USPS products, though telephones do affect the communication-based element of USPS services. Various forms of electronic diversion, discussed above, can represent not only direct competition but indirect competition for interpersonal communication, advertising and increasingly bill payment.

b. Telephones had reached nearly total US penetration by the time USPS started using its econometric demand model, and the variable was never included, as telephones has become saturated throughout the US. With the development of cellular technology and the internet, however, landline usage is dropping, particularly among younger and lower-income residents. As a result, a trend in the data now exists, which may bear some relationship to mail volume.

c. To that end, it is possible that telephone diversion could be modeled by number of landlines, with data provided from Center for Disease Control's National Health Interview Survey. Advertising variables are harder to determine, though data on the amount of money spent on radio or TV ads nationally may be available as a possible diversion variable, particularly for use in standard mail.

d. The current postal service demand models could be modified to include these variables. The AIDS model could also be used..

6. A reasonable alternative model may consider different consumer groups (each having its own set of preferred mail products) and model the postal demand separately by each group.

a. Is there a quantifiable connection between customer groups and classes of mail?
b. What sets of consumer groups should be defined for modeling postal demand?
c. What complications (in terms of data, econometric techniques, etc.) may arise using this modeling approach?
d. What other types of quantitative and qualitative analysis of mailers' behavior should be undertaken to improve the postal demand and forecasting models, and the accuracy of the estimated elasticities?

Response:

a. It is possible that connections exist between consumer groups and classes of mail, and analysis of the household diary study may reveal further details on those connections, but it can also be discerned by adding demographic variables to the current postal demand models, which, in addition to strengthening the Postal Service model, could verify the results from the household diary study.

b. An initial breakdown could be by household mailers and corporate mailers. Household mailers can be broken down by their demographic characteristics (household size, income, education, etc.), and corporate mailers could be broken down by their own demographic characteristics (number of employees, capitalization (if public), type of business by IRS classification, *etc*.).

c. Gathering data for non-public corporations would be difficult.

d. As Dr. Bradley notes, these mailers may not discriminate by shape, meaning that the models should follow suit and aggregate the projections of each consumer group to determine aggregate volume demand by product. Applying the share model to consumer groups also shows promise, as these disaggregated groups are more indicative of a mailer than aggregating the entire US into one share model.

7. Data issues often cause problems for demand forecasting and accurate estimation of price elasticities on a disaggregated level.

a. Would disaggregating postal data by geographic area and estimating the demand models using panel data on the geographic areas and years be useful?
b. What data sources and spatial software would be required to perform such data disaggregation?
c. What proposed changes in the reporting of postal data could provide for more accurate estimates of the price elasticities on a more disaggregated level?

Response:

a. Disaggregating postal data by geographic region and using panel data shows promise, but it has several potential issues. The first issue is mail traffic: the direction in which mail is going, whether in or out of a geographic area. It is important to include this distinction for determining mail in a geographic area. If mail is being observed at a DDU, it would also be important to note the origin of the mail, perhaps incorporating data from ODIS-RPW to determine demand for mail in a given area from other areas.

The second issue concerns consumer groups and share equations. Each area may have different kinds of consumer groups for mail, which would make a series of share equations difficult, as each consumer group would need to be the same across areas to easily aggregate volume demand into a national total. The mail consumer demographics of urban residents are likely to be rather different from the mail consumer demographics of rural residents.

The third issue concerns demographics. Population demographics will vary between areas and types of mail. Including those demographics into area-based volume equations is important to more clearly understand the distinctions between areas.

b. For disaggregating data by geographic area, share equations may prove useful. Additional data on US households and demographics would also be necessary to effectively model the geographic areas uniquely.

c. Using the preexisting product equations at a disaggregated area level would, provided the issues above are addressed, create a panel dataset, combining the pre-existing time-series data with cross-sectional data based on region. This panel data would control for additional variability in postal demand by including area, and would also allow the Postal Service to employ fixed-effects and random-effects models as appropriate to improve the accuracy of elasticities. These panel data, however, would not be entirely compatible with pre-existing time series data.

III. CONCLUSION

The Public Representative hereby submits Comments on the Commission NOI.

Respectfully submitted,

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